

## INDEX

All original articles published in the January through December, 1958 issues are abstracted in this index. See page 791.

## SUBJECT INDEX

This is an index of all the reading matter in the ARCHIVES, except the Medical News Department.

The letters used to explain in which department the matter indexed appears are as follows: "ab," abstracts, "E," editorial and the asterisk (\*) indicates an original article in the ARCHIVES.

This is a subject index and one should, therefore, look for the subject word, with the following exceptions: "Book Reviews" and "Deaths," are indexed under these titles at the end of the letters "B" and "D." The name of the author, in brackets, follows the subject entry. If there are more than two authors, only the name of the first author is given.

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## ABSTRACTS

*The following abstracted articles have been published in the January-December, 1958 issues of the journal.*

## JANUARY

**Implications of Measured Visuospatial Impairment in a Group of Left Hemiplegic Patients. V. B. Carroll. (pp. 11-14)**

● An analysis of errors on the Minnesota Test for Differential Diagnosis of Aphasia with left hemiplegic patients is presented in contrast with known test patterns of right hemiplegic patients with aphasia. The specific findings with the nondominant hemisphere group reveal a significant homogenous deficit in visuospatial, temporal and numerical relationships as well as a similarity in behavior responses to the observed impairment. The therapy attempted is discussed and the patient response is related to known concepts of learning theory. The implications of the residual deficits are then related to the individual vocational needs of the patient.

**Comparative Study of the Effects of Tenotomy and of Denervation. C. H. Flint; K. G. Wakim, and F. H. Krusen. (pp. 15-19; 3 figures and 3 tables)**

● In a large group of adult albino rats a comparative study at intervals up to 120 days was made of the work output, endurance, weight, and histologic structure of the muscles of the tendo achillis and the tibialis anterior in the lower extremities after tenotomy of the tendo achillis, excision of the tibial nerve alone, or complete denervation by high excision of the sciatic and femoral nerves. Excision of the tendo achillis led to gradual reduction of work output and endurance of the gastrocnemius-soleus-plantaris muscle group up to 30 days, after which there was a progressive return toward normal function. Careful dissection of the muscles at the time of return to normal function revealed complete reattachment of the excised tendon to bony eminences in the area. Tibial denervation gave unsatisfactory results. The findings were inconsistent. Complete denervation by excision of both sciatic and femoral nerves high up in the thigh was associated with consistent progressive deterioration of function, resulting in marked reduction of work output and endurance of the muscles and a histologic picture of complete denervation with marked decrease of muscle weight. The work output was practically nil toward the end of the observation period (120 days) in the muscles whose nerve supply was abolished by high excision of the sciatic and femoral nerves.

**Occurrence of So-Called "Myotonic Discharges" in Electromyography. J. Goodgold, and K. C. Archibald. (pp. 20-22; 3 figures and 1 table)**

● The occurrence of chains of high frequency oscillating electrical potentials combined with a characteristic "dive bomber" audio output is most usually associated with the classical myotonias (myotonia congenita and myotonia dystrophica). It appears rather that such characteristic potentials are most likely a manifestation of increased muscle irritability and are also seen in a variety of conditions including progressive muscular dystrophy, progressive muscular atrophy, and in various peripheral neuropathies. This study presents an analysis of the cases studied in the electrodiagnostic laboratory at the Institute of Physical Medicine and Rehabilitation in New York City along with a review of the literature and a discussion of etiological background of "myotonic" discharges.

**Stair Climbing as Exercise. G. G. Hirschberg. (pp. 23-27; 1 figure)**

● In rehabilitation, stair climbing is generally considered an activity of daily living which must be mastered. Stairs in the physical therapy department are used as "training stairs." This paper emphasizes the use of stair climbing as an exercise for weak lower extremities. Its advantages over manual resistance, pulley or boot exercises for strengthening are numerous: simultaneous exercise of several muscle groups, facilitation because of primitive pattern, economy of self exercise and group exercise. For coordination, stair climbing is simpler and more effective than

Frenkel exercises and "gait training" because step width and height offer a two dimensional guide to the foot. Finally, stairs are readily available in hospitals and in most homes. Indications for stair climbing, prerequisites and technics are discussed.

**Advantages of Intermediate Prosthesis in the Rehabilitation of the Lower Extremity Amputee: Preliminary Report. H. J. Bugel; W. Zilmer, and J. Grigsby. (pp. 28-35; 2 figures and 5 tables)**

● A physical medicine and rehabilitation program utilizing an intermediate prosthesis for amputees has been successful over the past years in reducing the time interval between amputation and ambulation, with subsequent improvement in patient morale and well-being.

## FEBRUARY

**Rehabilitated for Living. M. Hoberman, and B. H. Lipton. (pp. 75-81; 7 charts)**

● A review is presented of the status of graduates of the Joseph Bulova School of Watchmaking. Graduates whose disability resulted from injury or disease to the spinal cord, and those who have had tuberculosis or cardiac disease are studied. These particular individuals were selected because of the severity of the disability and the difficulty usually encountered in vocational placement.

**Physical Medicine and Rehabilitation in a Chronic Disease Hospital. J. S. Tobis; M. Lowenthal, and I. Belmont. (pp. 82-86)**

● One of the major health problems in America today is care of the chronically ill, especially the elderly patient. Physical medicine and rehabilitation offers a major contribution to the care of such patients in chronic disease hospitals, nursing homes and old age homes. This report deals with the multiplicity of services that have been developed by the physical medicine and rehabilitation department in a 2,000 bed municipal chronic disease teaching hospital. Subjects discussed include ward patient care, sheltered workshop program, prosthetic clinic, occupational therapy program for a psychiatric service, hospital-wide activities of daily living program, education and research. Of particular interest is a statistical analysis of the services provided, the active sheltered workshop program, problems in the management of young adult patients in a chronic disease set-up, accident control, and the children's rehabilitation program. A discussion of the problems encountered may assist others in dealing with patients in similar or analogous medical settings.

**Physical Treatment Employed in the Rehabilitation of a Patient with Morquio's Disease. R. T. McReynolds, and O. L. Huddleston. (pp. 87-91; 3 figures)**

● A seven-year-old boy with Morquio's disease was treated at an acute hospital for correction of progressive deformities of his trunk. Complete flaccid paralysis developed at T 11 following a spinal fusion. A partial laminectomy resulted in partial return of sensory and motor function. Bilateral fractures of the femora occurred three months later when the father attempted to teach the child to walk. During the course of treatment of the fractures, trophic ulcers developed on the back, knees, and ankles. The bones eventually healed and the patient was sent to a rehabilitation center for appropriate physical treatment. The ulcers were healed by using a heat cradle and placing the patient in a sawdust bed. Severe contractures of the hips and knees were present, in addition to the paresis and paralysis of the muscles of the lower extremities. Physical treatment in the form of neuromuscular re-education, hydrotherapy, mobilization therapy, gait training, and self-care training over a period of eleven months enabled the patient to learn to walk with the aid of crutches and long-leg braces. The vital capacity of the patient doubled by the use of breathing exercises and mobilization therapy.

### Social Security for the Disabled. A. B. Price. (pp. 92-93)

• Determination of "disability" under the social security law provides for payments before normal retirement age, and it protects against loss of retirement and survivor benefits because of reduced earnings. An integral part of the disability program is the referral of the disabled for vocational rehabilitation services.

## MARCH

### Application of Rehabilitation Techniques in Respiratory Insufficiency. L. Lewis. (pp. 139-144)

• Chronic respiratory disability is usually treated by techniques applied according to the specific disease entity, not always in clear relation to the abnormal physiology which exists. There has been only limited application of the principles of rehabilitation in the management of respiratory disability. These principles would require the use of an integrated physical (respiratory assistive), pharmacologic, immunologic, psychosocial and broad medical-surgical program determined by the changing needs of the individual patient. Experience in total care of poliomyelitis patients with respiratory disability has led to a new approach to the management of other seemingly unrelated problems. Chronic respiratory insufficiency and acute crises due to pulmonary emphysema, fibrosis, atelectasis, kyphoscoliotic lung compression and many other conditions have been successfully managed by the use of any or all of the following measures: tracheostomy to diminish respiratory dead space and improve freedom of air flow; bronchodilator drugs to diminish airway resistance; mechanical respirators of many types to assure adequate ventilation and to control respiratory acidosis; oxygen to maintain an adequate partial pressure of oxygen in arterial blood; antimicrobial drugs and vaccines to eliminate infection; pneumoperitoneum to help restore diaphragm-lung relationships for effective breathing; resection of space occupying cysts or diseased lung tissue; physical and occupational therapy for general strengthening and for specific improvement of respiratory muscle function, and psychological support and social service, including vocational rehabilitation, paralleling the medical program.

### An Analysis of Residual Disabilities (Paralysis and Crippling) Among 100,000 Poliomyelitis Patients: With Special Reference to the Rehabilitation of Postpoliomyelitis Patients. K. S. Landauer, and G. Stickle. (pp. 145-151, 2 figures and 8 tables)

• An analysis of residual disabilities among poliomyelitis patients has value for many reasons. An important one is to help determine the size and composition of the caseload of poliomyelitis patients who might benefit by further active rehabilitation procedures. The present analysis is based upon compilation and tabulation of data obtained from a series of patient-care reporting forms used by hospitals to notify chapters of The National Foundation for Infantile Paralysis, Inc., of the admission, continued care and discharge of poliomyelitis patients. More than 1500 hospitals have submitted more than 1,000,000 forms since the inception of a reporting system in 1952. Detailed case histories are available for slightly more than 100,000 hospitalized poliomyelitis patients. The reporting forms call for information on the area and degree of paralysis, as well as functional capacity, as reported by the attending physician, for each patient. It was therefore possible to make cross-classifications on disabilities, graded as none, slight, moderate or severe, in eight body areas; namely, left and right arms, left and right legs, intercostal muscles, diaphragm, abdominal muscles and trunk extensors. On the basis of a scoring system which combines degrees of disability for these specific areas of the body, it is possible to estimate percentages and numbers of paralytic patients with no, slight, moderate and severe residual disability. When these estimates are compared with reported functional capacity—ability to stand, walk, feed, toilet self, etc.,—they match closely.

### Morale and Productivity in a Sheltered Workshop for the Severely Disabled. H. S. Rabinowitz. (pp. 152-157)

• This report considers workshop climate, work habits, and personal interactions in a research sheltered shop

for severely disabled, hospitalized patients before and after introduction of light subcontracting. Before subcontracting was initiated, production emphasis was given solely to handicraft projects. Introduction of subcontracts was accompanied by three changes in conditions of work. Possible connections between these changes and increases of morale and productivity are discussed.

### New Apparatus: A Portable Overhead Pulley Apparatus with Adjustable Pulley Positions. L. B. Newman. (pp. 158-159; 1 figure)

• A portable overhead pulley apparatus which is simple, stable, inexpensive and easily constructed with standard parts is described. The equipment can also be quickly disassembled for shipping purposes.

## APRIL

### Paraffin Bath as Thermotherapy: An Evaluation. C. W. Stimson; G. B. Rose, and P. A. Nelson. (pp. 219-227; 7 figures)

• The paraffin bath is an effective means of applying heat to the hands, wrists and elbows and to the feet and ankles. It is a valuable adjunct in local treatment of involved parts for such conditions as rheumatoid arthritis, osteoarthritis, tenosynovitis, and reflex sympathetic dystrophy. Contraindications for its use are impaired arterial or venous circulation, dermatitis, open wounds or heat sensitivity. The effectiveness of paraffin bath, whirlpool bath, and contrast bath in heating of an extremity is compared. A disadvantage in the past has been the difficulty in utilizing the paraffin bath for home treatment. A safe and practical way of arranging such therapy in the home is described.

### Use of Cinefluorography for Evaluation of Normal and Abnormal Motion in the Neck. F. J. Kottke, and R. G. Lester. (pp. 228-231; 2 figures)

• A fluoroscopic intensifier system is described which makes possible the use of cinematographic recording of cervical vertebrae during motion. This apparatus exposes the patient to less radiation than does an ordinary fluoroscopic examination. The positions and relationships of the vertebrae through the full range of motion are recorded on 16 mm. film at 16 frames per second. Studies of normal and abnormal relationships are demonstrated.

### Effects of Delayed Electric Stimulation on Experimentally Denervated Muscle. K. G. Wakim. (pp. 232-234; 1 figure)

• The effects of immediate and delayed electric stimulation were compared in an attempt to determine whether delayed electric treatment would help denervated muscle in a manner commensurate with the help afforded by immediate electric stimulation. Adult albino rats were used—normal controls and seven groups denervated by excision of a long segment of the sciatic and femoral nerves of the left extremity at the base of the thigh. At the end of the treatment period of 30 days the tendo achillis of the left leg in each rat was separated from its insertion and connected to the work output machine for determination of the initial and total work output of the gastrocnemius, soleus, and plantaris muscles. The findings clearly indicate that delayed electric stimulation did not improve the work output and endurance of denervated muscle.

### Rehabilitation of the "Permanently and Totally Disabled" Patient. M. Hoberman, and C. F. Springer. (pp. 235-240; 8 tables)

• Preliminary results of a pilot program to rehabilitate the "permanently and totally disabled" welfare recipient are reported. The areas of improvement included self-care activities, vocational potentialities, ambulation status, and living arrangements. While these results are most encouraging, especially since the gains have been maintained in practically all patients reviewed for at least six months following discharge from the hospital, they cannot be considered final. In many instances difficulties in the patient's total adjustment encountered after discharge, such as in housing or employment, may nullify much of the benefit previously achieved.



**A Method of Attempting to Prevent Increasing Paralytic Spinal Curvature in the Growing Child.** R. A. Haag. (pp. 241-244; 7 figures)

● By the application of a puller to a spinal brace some correction of paralytic spinal curvature in growing children has been obtained. Diligent care must govern the location at which the puller is attached to the brace. The location of the apex of the curve determines the position of the puller. X-ray determination of the correction obtained and the progress of the curve is mandatory. This is a stop-gap method of treatment to prevent increasing deformity and is useful only in the young growing child.

**Is Elastic Bracing Contraindicated in Spastics?** O. Machek. (pp. 245-246)

● A discussion about elastic bracing and its influence on spasticity prompted a suggestion that perhaps elastic bracing did not cause an increase in spasticity. This initiated a study of 84 patients who were fitted with both Klenzak and 90° stop braces. The length of followup of these patients varies from two and a half years to six months. In four instances a 90° stop brace was changed to a Klenzak type of brace without increase in spasticity. The subjective and objective evaluation suggests that there is no contraindication to elastic bracing in spastic conditions such as cerebral palsy, spasticity, and old spastic hemiplegia. This is true of both children and adults. The explanation of this phenomenon is simply the adaptation.

**Bacterial Resistance to Ultraviolet Irradiation.** F. Becker, and E. V. Lipscomb. (pp. 247-248)

● Complete kills of accessible bacteria due to ultraviolet irradiation were obtained in successively irradiated survivors of colonies of *M. pyogenes* var. *aureus* well within therapeutic limits to which human tissue tolerance can be readily induced. With the light source and conditions employed, there was no photoresistance nor were any mutations induced when increasing exposures of "far" ultraviolet irradiation up to the point of a complete kill were employed.

## MAY

**Electromyographic Observations in Patients with Tetanus: With Special Reference to the Effect of Drugs.** M. A. Perlstein; M. Turner, and H. Elam. (pp. 283-289; 3 figures)

● Seven patients with tetanus, four of them heroin addicts, were followed clinically and electromyographically, both in the acute stage of the disease and during treatment with various drugs. EMG activity without medication was characterized by silence or by fasciculatory and repetitive activity in the intervals between spasms and by an interferential curve during the spasms. Effects of Chlorpromazine, Pentobarbital, Meprobamate and MAR 710 are described.

**Rehabilitation of the Elderly Double Above-Knee Amputee.** M. Lowenthal; A. O. Posniak, and J. S. Tobis. (pp. 290-295; 6 tables)

● Though not commonly encountered, the elderly double above-knee amputee presents one of the most difficult problems in rehabilitation. Clinical experience with a small group of these patients indicates that there are a number of significant factors related to incidence, age, distribution, complicating diseases, selection of patients for prostheses, the type of prosthesis, stubbies or full length limbs, the rehabilitation goals and the feasibility of these patients functioning in the community. This presentation offers some solutions in relation to these problems and suggestions as to areas requiring further clarification and investigation.

**Usefulness of Electromyography in Difficult Diagnostic Problems.** B. J. Doyle, and H. E. Fidrocki. (pp. 296-302; 5 figures)

● The electromyograph continues to be a valuable instrument in the armamentarium of a physical medicine department for the diagnosis and differential diagnosis of many neurological conditions. When used frequently, diligently, and intelligently, electromyography will, in addition to the many well-recognized findings, also uncover certain unusual and unexpected findings which require interpretation. This paper includes a number of case histories and describes the unusual findings in each. It also attempts to explain the electromyographic observations thereby increasing the usefulness of electromyography to a greater field of indications. Included in the case reports are a case of familial periodic paralysis showing myotonic-like discharges in the recovery stage and also a case of myotonia diagnosed on the basis of the characteristic electromyographic which preceded the clinical observations of mechanical and electrical myotonic reactions by some time.

**Preliminary Report on Neuromuscular Function Testing of the Upper Extremity in Adult Hemiplegic Patients.** G. Reynolds; K. C. Archibald; S. Brunnstrom, and N. Thompson. (pp. 303-310; 6 figures)

● A measurement of return of motor function following hemiplegia is described. This test utilizes the basic synergies of motion of the upper extremity, observed in extensive upper motor neuron disease. The background for its use follows the development of progressive functional activities out of the synergies described. Its advantage over standard muscle testing procedures has been discussed. It would also be desirable to stimulate further exploration of better methods of evaluating these poorly understood responses in both the upper and lower extremities in all areas of upper motor neuron disease, so that therapeutic techniques utilizing such responses may likewise be more effectively evaluated.

**Use of Portable Standing Beds in the Care of Long-Term Disabled Patients.** L. A. Leavitt. (pp. 311-314; 3 figures)

● Portable standing beds that are fabricated by the PM&R Service are utilized throughout this general medical and surgical hospital in the treatment of long-term disabled patients. This standing bed is quite similar to those commercially available but with additional modifications. This paper will outline in more detail our program in the utilization of this bed in its entire concept, various modifications and attachments.

**The Wheelchair Fender Drive.** O. L. Huddleston, and J. W. Campbell. (pp. 314-315; 2 figures)

● The construction, arrangement, and usage of the wheelchair fender drive is described. This product was designed by the Physical Aids Development Society which is dedicated to the design and construction of apparatus and equipment to help physically handicapped patients.

**Use of Sand as an Ambulation Medium in Gait Retraining and Correction of Faulty Foot Posture.** F. Becker, and W. P. Denny. (pp. 316-318; 1 figure)

● The use of a sand area as a treatment adjunct in gait retraining, correction of faulty foot posture and poor weight distribution, and in toning and strengthening the smaller muscles of the foot and ankle provides definite advantages for both the patient and the instructor as compared to the use of hard surfaces in rendering such treatment.

## JUNE

**Some Factors Influencing the Temperature Distribution in Thighs Exposed to Ultrasound. J. F. Lehmann, and E. W. Johnson. (pp. 347-356; 10 figures and 6 tables)**

● Thigh specimens were exposed to a uniform ultrasound field under well-controlled conditions. The temperature distribution was measured along the axis of the sound beam and the heating pattern studied with special reference to the occurrence of the selective rise of temperature in certain tissues. The factors determining the temperature elevation in the specimens such as absorption and interface reflection of ultrasound, the specific heat and heat conductivity of tissues, were analyzed and their significance for the resulting temperature distribution discussed. Also the temperature gradient in the thigh as it occurs in man and its influence on the rise of temperature resulting from exposure to ultrasound was investigated.

**Effects of Breathing Exercises on Pulmonary Emphysema. J. B. Redford. (pp. 357-365; 2 figures and 3 tables)**

● According to studies done to date, breathing exercises seem to have little objective value in emphysema but their subjective value should not be dismissed lightly. No laboratory methods are yet devised for measuring all factors that may be improved by these exercises. The main stress should be on the importance of living within the physical bounds imposed by the disease and the use of these exercises in recovery from dyspnea when these bounds are exceeded.

**Ambulation Problems in Hemiplegia. E. J. Lorenze; A. J. DeRosa, and E. L. Keenan. (pp. 366-370)**

● This is a report on 200 cases of hemiplegia resulting from a variety of etiological factors including trauma, cerebral vascular accident, including hemorrhage and thrombosis, cerebral embolus and others, which were admitted to the rehabilitation service of The Burke Foundation. A specific analysis of the physical, social, psychological and vocational status of these patients is included as well as the results of rehabilitation treatment. In particular, the paper analyzes those patients who failed to achieve independent ambulation; achieved only partial independence in ambulation, or who required a prolonged period of treatment before a satisfactory degree of ambulation was achieved. Ordinary problems of a general medical nature, associated amputation, fracture or arthritis and paralytic muscular factors are evaluated. However, primary stress is not placed upon these but rather on problems of cerebellar system involvement, ataxia, apraxia, perceptual problems. The specific problems of muscular weakness and spasticity are outlined.

**Bilateral Effects of Unilateral Exercise: Experimental Study Based on 120 Subjects. R. D. Kruse, and D. K. Mathews. (pp. 371-376; 3 figures and 3 tables)**

● The purpose of this study was to test the bilateral effects of unilateral strength-building exercises on the elbow-flexor muscles. Sixty male college students were periodically subjected to ergometric exercises of the left elbow-flexor muscle group for four weeks. Fifteen subjects exercised twice weekly, fifteen three times weekly, fifteen four times weekly, and fifteen five times weekly. A control group of equivalent size was matched to each exercising group. The results of this study are: statistically significant increases in strength and endurance of the left (exercised) elbow-flexor muscles in the groups exercising three, four, and five times weekly; no statistically significant increases in strength and endurance of the left (exercised) elbow-flexor muscles in the group that exercised twice weekly; no statistically significant increase in strength and endurance of the right (unexercised) elbow-flexor muscles in any of the experimental groups, and no statistically significant increases in strength and endurance of the flexor muscles of either elbow in any of the control groups.

**Swimming by the Handicapped. N. K. Covalt. (pp. 377-380)**

● The majority of handicapped persons can learn to swim; many can be taught to get in and out of a pool with little or no aid. Since swimming is one sport that utilizes all muscles, optimal physical conditioning can be obtained or maintained. This is a step beyond definitive underwater therapy — which it can also enhance, but which is no longer needed by a rehabilitated individual. It furnishes recreation, socialization and competition.

## JULY

**Heidelberg Pneumatic Arm Prosthesis. E. F. Hoerner. (pp. 411-416; 4 figures)**

● The Pneumatic Arm, devised in Germany, offers an additional asset to persons who have lost part of an upper extremity, as well as those who have a disability resulting in a flaccid upper extremity, such as quadriplegia from poliomyelitis or trauma. The principle of this orthopedic appliance is the use of carbon dioxide gas as the driving force or energy used in carrying out needed functional motions of the mechanical parts of the prosthetic apparatus. This gas is enclosed in a small cylinder which is contained within the prosthetic device. The person using such an apparatus controls the motion desired by releasing the gas outlet valve through pulling on a cable, using such movements as a shoulder shrug, shoulder flexion, intrascapular excursion, body (trunk) bending, or other similar procedures. In this way, it has been possible to provide the disabled person with the following appliance motions: prehension of the hand or terminal device, pronation and supination of the forearm (a motion that has not been possible to duplicate with any other prosthetic device), elbow flexion and extension, shoulder flexion and extension. All of these motions are performed smoothly and quickly, without a time lag, and with a mild degree of energy expenditure by the wearer. This appliance has also been found useful in assisting persons, with a flaccid upper extremity to carry out needed functional motions, by applying the energy supplied by the gas to drive the mechanical parts of an upper extremity functional arm, and/or hand, and/or shoulder brace.

**Interpersonal Processes in a Respirator Center. C. P. Deutsch; I. E. Alger; E. McNamara; J. Williams; J. F. Shor, and J. G. Benton. (pp. 417-425; 2 figures and 3 tables)**

● The purpose of this study was to investigate the quantity and quality of the continuing interpersonal process in a chronic care center. The data were gathered by means of procedures derived largely from social psychology, including structured interviews with patients and staff, daily time-sample observations, and process recording of all conferences during the period. The data were coded and the results analyzed quantitatively.

**Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration: I. Inspiration. G. H. Koepke; E. M. Smith; A. J. Murphy, and D. G. Dickinson. (pp. 426-430; 2 figures and 1 table)**

● Previous electromyographic observations in the laboratory indicated that the first intercostal muscle and diaphragm were used in quiet breathing but that expiration occurred passively. A subsequent investigation has been made of the sequence of action of intercostal muscles at measured lung volumes during the various intervals of the respiratory cycle. The measurements of lung volumes were synchronized with the electromyographic activity of the intercostal muscles of normal men. The activity of several muscles was recorded simultaneously, by means of the multiple channel electromyograph using the needle technic. The evidence indicates that the intercostals were serially recruited with deeper breathing. In most instances the first intercostal muscle showed electrical activity at the onset of inspiration. As this inspiration deepened there was successive recruitment of the second through the eleventh intercostal muscles.

**Influence of Arteriovenous Fistula on the Distal Circulation in the Involved Extremity.** K. G. Wakim, and J. M. Janes. (pp. 431-434; 1 table)

● By use of the venous occlusion plethysmograph with a compensating spirometer recorder, the blood flow in the lower extremities below the knee was measured before and after induction and repair of the arteriovenous fistula of the involved extremity. After the establishment of the preoperative blood flow values, a femoral arteriovenous fistula was surgically induced in the stunted limb. At various periods after operation up to about one year, the blood flow was measured in both the normal and the operated extremity and was compared with the preoperative value. After induction of the arteriovenous fistula, the blood flow in the involved extremity in each of the seven subjects was reduced, in two of them slightly, but in the remaining five significantly. In four patients with congenital or accidental arteriovenous fistula in one of the lower extremities, a similar study was made on the blood flow before and after surgical repair of the fistula. The distal blood flow in each of the involved extremities increased on repair of the arteriovenous fistula. The presence of an arteriovenous fistula in the lower extremity reduces the flow of blood to the distal parts of that extremity.

**Uses of Miniature Furniture in Aphasia Retraining.** J. Ehrlich, and J. C. Cook. (pp. 435-439)

● Methods for evaluating the aphasic patient and planning individualized therapy, taking into consideration the educational and vocational background, as well as the type and extent of the aphasia are described. Description, purpose and use of a specific type of equipment—separate, miniature “rooms” and household objects, tools and other kinds of furnishings to scale—are given. Three case studies illustrate the uses of this device.

## AUGUST

**Conditions for Optimum Work Output in Elbow Flexion, Shoulder Flexion, and Grip Ergography.** H. H. Clarke; E. A. Irish; G. A. Trzynka, and W. Popowich. (pp. 475-481; 2 figures and 7 tables)

● Use of the Kelso-Hellebrandt ergograph in single-exercise bouts of the elbow flexor and shoulder flexor muscles has been previously reported. The essential feature to achieve precision was the determination of proper load for each movement; this was found as proportionate strength of exercised muscles. For an eight-inch lever arm and with cadence of 30 repetitions per minute, the proportions were: three-eighths elbow flexion strength for elbow flexion ergography; and five-eighths shoulder flexion strength for shoulder flexion ergography. These proportions produced repeatable results, not necessarily optimum work output. The present study investigated conditions which would produce optimum work output for the elbow flexors, shoulder flexors, and gripping muscles. In each instance, experimentation was had with five cadences and five proportionate strengths, a total of 25 conditions. Exercise sessions were limited to two minutes; and the ergographic lever arm was kept constant at eight inches. Work output was the product of load in grams and cumulative distance load was raised. The optimal work output conditions were: elbow flexors, one-fourth proportion at 76 cadence; and gripping, one-half proportion at 76 cadence.

**Evaluation of Rehabilitation of the Severely Handicapped Cerebral Palsied Child.** A. O. Posniak; P. Saturen; J. S. Tobis, and H. M. Wallace. (pp. 482-487; 7 tables)

● The experience of the children's cerebral palsy unit of the department of physical medicine and rehabilitation of the New York Medical College, Metropolitan Medical Center since its inception in October, 1954, is reviewed. Based on work with 53 severely disabled cerebral palsied children, with multiplicity of intellec-

tual and physical handicaps, an attempt has been made to assess objective functional improvement in major activities of self-care and ambulation. Criteria were set up to determine the amount of capacity to function in feeding, dressing, toileting, ambulation, and speech, on admission and at time of study. An assessment of the results of an active rehabilitation program for this severely handicapped group has been made with a discussion of the special goals that must be set, the factors which effect progress in these major areas, and the additional gains that can be seen are presented.

**Pre-Vocational and Vocational Training for the Cerebral Palsied.** J. E. Maschmeyer; M. H. Jones; A. Bairo; P. Holser; C. Blackburn, and S. Kupferman. (pp. 488-493; 7 figures and 1 table)

● In 1952 the United Cerebral Palsy Association of Los Angeles County opened its pre-vocational and vocational Industrial Training Workshop in Los Angeles. Applicants are screened by a team of specialists, and routine laboratory procedures are carried out. Applicants can be divided into two main groups namely those with potential for industrial employment, and those too severely handicapped to compete in industry. Trainees follow individualized programs directed toward fullest development of potential. Some, because of limitations, receive training only in the activities of daily living. The Industrial Training Workshop simulates actual industrial employment conditions, insofar as possible. Equipment is ingeniously adapted to the special needs of trainees. The Center is on a nearly self-supporting basis. Goals of the Center are to train severely handicapped cerebral palsied adults for self-sufficiency in activities of daily living; to train and place potentially capable cerebral palsied individuals in private industry; to determine basic standards for recognizing potentialities at an age earlier than now possible; a research program to determine the results of this “sum-total push” program is now being carried out; to determine correlation between dexterity and coordination, and future work potential. The records of this Center will furnish basic statistics in many aspects of cerebral palsy.

**The Intermittent Double Step Gait.** M. Pesceyanski. (pp. 494-496)

● A gait technic and its two variations that many disabled persons use are described. In the first variation the patient tends to lose his balance abnormally during the stance phase of the disabled leg, and in the second he loses his balance during the swing phase of the involved lower extremity. The patient reacts to the shock of imbalance by pausing immediately after every other step. Because of these aberrations, characteristic and distinctive patterns result. The intermittent double step gait is a method applied successfully, and often found to be the only method, in training some of the severely disabled persons to walk independently and safely. Indications for prescribing the intermittent double step gait are discussed in detail.

**Lower Extremity Prostheses for Patients Past Fifty.** M. R. M. Blashy, and H. V. Morelewicz. (pp. 497-502; 3 figures and 1 table)

● This paper discusses the requirements which a patient must meet before any type of prosthesis can be prescribed. Included is an evaluation of the component parts that make up a specific prosthesis to meet the needs of the amputee past the age of fifty. Finally, whenever a patient needs a replacement or an additional prosthesis, what factors must be met to give the patient an adequate prosthesis are mentioned.

**Some Help in the Drafting of a Physical Therapy Law.** F. M. Brist, and E. C. Elkins. (pp. 503-508)

● A study of physical therapy laws now in effect resulted in the “guide law” prepared by the American Registry of Physical Therapists. Close study of the material presented will indicate that one provision or another may be more suitable in a given state and for that reason explanatory notes are appended to certain sections of the “guide law.”

### An Experimental Group Approach Supplementing Rehabilitation. I. A. Kraft. (pp. 509-513)

• An experimental group therapy program was instituted with parents of adult cerebral palsy patients. It attempted to test certain hypotheses about alterations of personality in cerebral palsy patients, especially those with speech handicaps.

### Employability Following Poliomyelitis. M. E. Knapp, and L. Sher. (pp. 514-518; 8 tables)

• This paper is a statistical study of the effect of poliomyelitis upon the employability and economic status of 4,409 patients discharged from the Elizabeth Kenny Institute from 1942 through 1955. This information is correlated with the type and severity of involvement and the age at which the patient contracted poliomyelitis.

## SEPTEMBER

### Nutrition and Dental Care in a Physical Medicine and Rehabilitation Program. S. I. Silverman, and J. S. Tobis. (pp. 555-559)

• There is prevalent today a relatively widening gap between carefully planned and prepared dietary requirements of chronically ill patients and the actual ingestion of these diets. One of the major causes of this gap is the character of the dental care rendered to both the homebound and the institutionalized chronically ill patient. The quantity of food and the selection of food ingested by patients are influenced and conditioned by dental treatment and the general state of masticatory efficiency of the patient. The ingested diet is also conditioned by the social dietary history of the patients, the grouping of the patients at mealtime, the frequency of mealtime, and the availability and the character of supplementary meals. Dental care when carefully integrated in the scheme of physical medicine and rehabilitation programming can broaden considerably the base of general supportive therapy, not only in implementing nutritional treatment of the patients, but also in contributing to their speech capacity and general esthetic appearance. Thus adequate dental care, with emphasis on the prosthodontic considerations aid in the psychological adjustment of the patients in the management of their chronic illness.

### Pain Threshold Measurements After Therapeutic Application of Ultrasound, Microwaves and Infrared. J. F. Lehmann; G. D. Brunner, and R. W. Stow. (pp. 560-565; 4 tables)

• Pain threshold measurements have been made with the Wolff and Hardy method after application of ultrasound, microwaves and infrared to volunteers. It was found that the pain threshold was increased when these modalities were applied to the peripheral nerve trunk and the pain threshold measured in the area of the nerve distribution. The pain threshold was also elevated when these modalities were applied directly to the same area where the pain threshold was determined afterwards. These results could be obtained only if comparatively high doses were applied.

### Establishment of Oscillometric Clinical Norms for Arterial Circulation in the Legs in Arteriosclerotic Obstructive Disease. B. S. Troedsson. (pp. 566-571; 2 figures and 7 tables)

• Disability, and ultimate loss of extremities, is increasing as a result of decreased arterial circulation due to arteriosclerosis in an aging population. Early discovery and proper management at the various stages of the disease can shorten disability and prevent amputations. Because of this, it is important to be able to evaluate the degree of arterial circulation and to localize the site of obstruction. By observation and measurement on a series of cases, using the oscillometer, it is possible to establish certain clinical norms. These norms are the gangrene point, i.e., the readings below which gangrene is imminent; the ulcer healing

point, i.e., the readings below which an ulcer will heal slowly or not at all; amputation site healing point, i.e., the readings above which the amputation site will heal readily; amputation site weight-bearing point, i.e., the readings above which a prosthesis can be used without fear of stump breakdown and above which there is also a margin for future deterioration of the circulation, and lower limit of normal point, or walking point, i.e., the readings below which a person will complain of symptoms of arterial insufficiency when walking. These norms have been found very useful in peripheral vascular work.

### Comparative Strength of Neck Flexor Muscles in Normal and Postpoliomyelitis Children: A Preliminary Study. T. Humphrey, and D. Rubin. (pp. 572-576; 3 figures)

• This study was prompted by the questions what is the "normal" strength of a child's neck flexors? — is it possible to develop an objective measure for determining the degree of weakness in the neck flexors of postpoliomyelitis children? A group of 100 children between the ages of 3 and 12 was tested; 47 of this group were "normal" controls and 53 were postpoliomyelitis patients. For the purpose of the test the subjects were divided into three age categories: group A from 3-6 years, group B from 6-9 years, and group C from 9-12 years. By utilizing a fixed supine position and free active motion a base line of performance was obtained. Resistance was then added by means of an adjustable head strap, weight pan, and weights. The preliminary results demonstrated that there is a great variance in neck flexor strength in both postpoliomyelitis and nonpoliomyelitis children. Certain interesting observations were made relative to neck flexor strength within each group, between the two groups, and on the basis of body type.

### Prevention and Control of Staphylococcus Infections in Hospitals. (Bulletin 1). American Hospital Association. (pp. 577-580)

• In view of the increasing problem of staphylococcal infections in hospitals and the consequent need to call the recommendations in this bulletin to the attention of the field, the Board of Trustees of the American Hospital Association requested this information be printed in "journals of other health organizations."

### Pressure Gauge Device as an Aid in Treating Hip Contractures Following Above-Knee Amputation. T. F. Childs, and M. Holtzman. (pp. 581-583; 3 figures)

• A method of facilitating flexor relaxation during active extension of the hip is described. Adequate range of motion improves function with a prosthesis. Flexion-abduction contractures decrease range of motion when they occur in above-knee amputees. Flexion contracture can be prevented or stretched by active extension and simultaneous relaxation of the flexors. Abduction contractures automatically improve with improvement of flexion contracture.

## OCTOBER

### Trochanteric Bursitis: Diagnostic Criteria and Clinical Significance. T. P. Anderson. (pp. 617-622; 1 figure and 6 tables)

• A review of the literature would imply that trochanteric bursitis of the hip is rare. Most reports deal with "acute calcific bursitis." It is chronic trochanteric bursitis, a more common condition but often unrecognized because of its subtlety, for which an attempt is made in this study to provide criteria for its diagnosis. An analysis is made of pertinent factors in the history and physical examination of 45 cases. In considering whether or not trochanteric bursitis is a separate clinical entity, it is shown that in more than 50 per cent of these cases the bursitis was associated with some other painful situation in the same lower extremity or the back.



**Evaluation of Pressure as a Factor in the Production of Ischial Ulcers.** M. Kosiak; W. G. Kubiczek; M. Olson; J. N. Danz, and F. J. Kottke. (pp. 623-629; 7 figures and 1 table)

● Ischial decubital ulcers in patients with spinal cord injuries have always been one of the more serious problems interfering with general maintenance and total rehabilitation. Ulceration is due to tissue ischemia caused by a mechanical sitting pressure which exceeds the tissue capillary pressure, especially over the ischial tuberosities. Limiting sitting time, frequent changing of position, using sponge rubber and alternating air pressure cushions have done little to reduce the incidence of ulcer formation in even the most conscientious patient with only lower cord involvement. In the quadriplegic patient, the problem is of even greater importance. Pressures were measured beneath the ischial tuberosities and at ten other points under the sitting area while subjects sat in several types of chairs including a contoured alternating-pressure wheelchair. Attempts were made to determine the position and exact amount of pressure over the entire sitting area in a group of normal subjects. The differences and distribution of pressure which prevailed in the various seats were recorded. Preliminary studies indicate that the pressure varies directly with the weight of the patient. On a nearly flat surface most of the pressure is concentrated beneath the ischial tuberosities and exceeds the systolic pressure. On a contoured seat the pressure is distributed more widely but at all points generally exceeds the diastolic pressure.

**A Method for the Quantitative Measurement of Spasticity and Its Response to Therapy.** W. J. Erdman, and A. J. Heather. (pp. 630-633; 3 figures and 3 tables)

● The need for a method whereby spasticity can be measured quantitatively is well recognized. By such a method the accurate evaluation of the effectiveness of anti-spasticity drugs as well as other forms of therapy can then be judged objectively in a more scientific manner. This study deals with a method of measurement and recording of muscle tension and electrical potential of the muscle in response to a mechanical stimulus of known magnitude. These findings are recorded by the use of a two-channel direct writer. The achilles tendon was stimulated mechanically. The muscle tension developed was measured by a strain gage which recorded the pressure. A skin electrode was used in recording the electrical potential of the muscle. Patients with spastic phenomena were evaluated before medications or other specific anti-spasticity therapy was given. After therapy the same patients were re-examined by the same technic and the serial findings were compared.

**Vocational Status Following Chemo-pallidectomy and Thalamectomy for Parkinsonism: I. The Problem and Initial Findings.** M. Riklan; L. Diller; Z. Laszewski, and I. S. Cooper. (pp. 634-641; 2 tables)

● A recent advance in neurosurgical therapy for Parkinsonism is described with concomitant progress in vocational rehabilitation for the patient. Material is presented concerning the nature of our population, the effects of Parkinson's disease on vocational functioning, and the long-range vocational status for the post-operative patient. Representative case histories are presented which indicate that vocational productivity has been greatly enhanced as a result of neurosurgery combined with postoperative vocational evaluation, counseling, and referral.

**Use of Hip Abduction Braces in Adults: Preliminary Report.** G. G. Hirschberg. (pp. 641-643; 2 figures and 3 tables)

● Various types of hip abduction appliances are in use for the treatment of congenital hip dislocation in infants. Such appliances have not been used in adults because they cannot correct congenital dislocation of a hip at a later stage and probably also because it does not seem practical and comfortable to use such an appliance in adults for any condition. This paper pre-

sents a number of case studies in which hip abduction braces have been a valuable adjunct in rehabilitation. The conditions treated by a hip abduction brace were spasticity of hip adductors caused by cerebral palsy or spinal cord injury, and adduction contracture of both hips in cases of rheumatoid arthritis and one case of osteochondro dystrophy. In all cases there was marked gain in the range of hip abduction and considerable improvement in gait. Several types of hip abduction braces were used. The type of brace as well as the method of use is discussed.

## NOVEMBER

**Comparative Study of Antispasmodic Drugs in Patients with Spinal Cord Injuries.** R. H. Nyquist; A. E. Comarr, and E. Bors. (pp. 683-691; 3 figures and 6 tables)

● This study evaluates the effect of meprobamate on the somatic and autonomic elements involved in spasticity problems and bladder function in patients with spinal cord injuries in comparison to Phenobarbital and zoxazolamine with comments on other treatments used in the past twelve years at a treatment center for spinal cord injuries.

**Influence of Surgical Metal Implants on the Temperature Distribution in Thigh Specimens Exposed to Ultrasound.** J. F. Lehmann; G. D. Brunner, and J. A. McMillan. (pp. 692-695; 5 figures and 1 table)

● Measurements of temperature distribution curves in the thigh specimen with and without surgical metal implants have demonstrated that the presence of the metal implant does not lead to any appreciable rise of temperature in front of the metal. The thermal conductivities of metals and of the surrounding tissues were compared. Data suggest that it might be possible to use ultrasound as a means for deep heating of tissues in spite of the presence of the metallic surgical implants. Further studies in live animals must be done before application to human beings can be safely considered.

**A Device for the Application of Heavy Lumbar Traction: Its Mechanical Effects.** J. F. Lehmann, and G. D. Brunner. (pp. 696-700; 1 figure and 1 table)

● A hydraulic device delivering heavy lumbar traction in an upright position has been described. The advantage of this design is that a smooth and fast release of the traction can be obtained. Under traction the proper alignment of the vertebrae of the lumbar spine is maintained. The machine produced a statistically significant widening of the intervertebral spaces and a therapeutic stretch of the lumbar musculature. Further controlled statistical studies will be necessary to investigate the question of the therapeutic efficacy of this method of traction.

**Heat Pyrexia Following a Hydrotherapeutic Procedure.** W. E. Marchand. (pp. 701-703)

● A case of heat pyrexia following a sedative bath with the temperature of the water between 95 and 97 F. is presented. The need for taking rectal temperatures and instituting such treatment only if the rectal temperature is found normal is stressed.

## DECEMBER

**The Eighth John Stanley Coulter Memorial Lecture: Training and Fitness — Concepts and Problems in Rehabilitation.** K. Harpuder. (pp. 751-775)

● Fitness for the handicapped and the aged can be defined in the same terms as for the average man with certain added limitations. Beyond clinical impressions, no data is available on how chronic arthritis, peripheral

vascular disease or chronic neurologic disease interferes with physical performance and what training, mechanical aids and adjustments will do for physical ability and total functional fitness. The purpose of training for the aged and handicapped is to increase their functional fitness, their ability to handle activities of daily living and management of a suitable occupation. In this instance, training is not a purpose unto itself. It should be designed to prepare for these activities on an individual basis, take maximum advantage of experience and skill, and give due consideration to psychologic factors. Thorough investigation is needed of the metabolic, respiratory and circulatory effects of exercise, of the methods, limits and goals of training, and finally a detailed study of the physiologic effects of specific daily, recreational and occupational activities in specific disabilities.

**Influence of Surgical Metal Implants on the Distribution of the Intensity in the Ultrasonic Field.** J. F. Lehmann; K. E. Lane; J. W. Bell, and G. D. Brunner. (pp. 756-760; 7 figures, 2 tables and 1 equation)

● The acoustic properties of metals used for surgical implants have been investigated, and it has been found that a large amount of ultrasonic energy is reflected at the tissue-metal interface. This leads to the establishment of patterns of standing waves in front of the implants and to focusing. The increase of intensity in the focal area has been measured and found to be appreciable. Further investigation seems to be necessary to determine whether or not the increase in intensity produced by the presence of surgical metal implants could lead to overheating of certain areas in the tissues.

**Some Medicolegal Aspects of Physical Medicine and Rehabilitation.** H. Wing, and A. L. Watkins. (pp. 761-765)

● This paper points out the ever-growing interrelationships between law and the specialty of physical medicine and rehabilitation. It is divided into three parts: 1. A brief discussion of applicable features of medical jurisprudence, 2. liability and responsibilities of physicians and other personnel of the departments within hospitals as well as legal implications of procedures and equipment employed, and 3. the insurance aspects which deal with medical reports, cooperation with statutory and administrative bodies such as Workmen's Compensation Boards, Rehabilitation Commissions, etc., and the evaluation of physical disability for purposes of litigation, settlements, or testifying in courts.

**Physical Medicine and Rehabilitation: Its Responsibility and Contributions to World Understanding.** H. A. Rusk. (pp. 766-769)

● Rehabilitation of disabled children and adults is an international language which transcends national ideological racial and linguistic barriers. It is one of America's sharpest tools for making friends. The world looks to the United States, as the international leader in physical medicine and rehabilitation, to assist it in sharing our knowledge through professional education of physicians and paramedical personnel throughout the world. This responsibility of the physiatrists of the United States has been greatly increased both by the political dangers of the current period and the rising incidence of physical disability throughout the world resulting from the prolongation of the life span. Never before, however, have the opportunities been so bright for us to meet this responsibility.

**Studies on the Disturbance of Longitudinal Bone Growth: II. Effect of the Sympathetic Nervous System on Longitudinal Bone Growth After Acute Anterior Poliomyelitis.** F. J. Kottke; G. G. Gullickson, Jr., and M. E. Olson. (pp. 770-779; 3 figures and 4 tables)

● Studies of the rate of growth of the long bones of the lower extremities have been conducted on 32 patients who had paralytic poliomyelitis involving one lower extremity primarily. Muscular strength, soft tissue mass, range of motion of the joints, posture, gait, and use of braces, crutches or canes were recorded. X-ray measurements of the bones of the lower extremities were made at intervals over a six-year period of time. The rate of growth of the involved lower extremity was compared with the rate of growth in the uninvolved extremity. Comparisons of the relative rates of growth were made during intervals when patients were receiving no medication and during the intervals when sympatholytic drugs were taken regularly. The influence of activity, limitation of motion and the use of braces are considered in evaluating the relative rates of bone growth. A relationship was found between sympathetic activity and the rate of longitudinal growth of bone which appears to have its influence through the control of the circulation to the extremity.

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